termine, upon comparing their Obſervations, which of thoſe Exploſions each of them ſee at the ſame Time; and thereby the Difference in Longitude of thoſe Places would be exactly had, as above. It would, however, be worth the While, this Way, to try whether ſuch common Meteors are diſcharged, at any conſiderable Height above the Clouds, and how far, and whether they differ much from one another in their Heights.

But theſe Speculations I leave, Sir, to your better Judgment, either to improve the Hint, if it deſerves it, or if not, entirely to ſuppreſs it; and in either Caſe remain

Yours, &c.

VI. *An Attempt made before the* Royal Society, *to ſhew how Damps, or foul Air, may be drawn out of any Sort of* Mines, &c. *by an* Engine *contriv'd by the Reverend* J. T. Deſaguliers, L. L. D. *and* F. R. S.

THE *Engine* repreſented by the *Model*, conſiſts of a Triple *Crank* working 3 *Pumps*, which both ſuck and force Air, by Means of 3 *Regulators*, and are alternately apply'd to drive Air into, or draw it from any Place aſſign'd, thro' ſquare wooden Trunks; which being made of ſlit Deal, and 10 Inches wide in the Inſide, are eaſily portable, and join'd to one another without any Trouble.

EXPERIMENT I. I fill'd a tall cylindrick Glaſs with the Steams of a burning Candle and burning Brimſtone Matches, in ſuch Manner that a lighted Candle

would go out almoſt as ſoon as it was let down into that foul Air. Then fixing the Trunks (or ſquare Pipes) to the forcing Hole of the Engine, I drove freſh Air into the Bottom of the above-mention'd Receiver; ſo that the foul Steam came out at the Top of the Receiver, which was open.

EXPERIMENT II. Having fill'd another Receiver (cloſe at Top) with foul Steams, as before, I plac'd it in a Poſition almoſt horrizontal, only with the cloſe End ſomething above the open End, that the foul Steam might not go out of it ſelf, when ſpecifically lighter than common Air. I fix'd the Trunks to the Sucking-hole of the Engine; and by working the Engine, drew out the foul Steams from every Part of the Receiver, as the Trunks were applied to them ſucceſſively.

EXPERIMENT III. Having fill'd with foul Steams, and ſet upright (as in the firſt Experiment) the cylindrick open Receiver, I applied the Trunks to the ſucking Part of the Engine, with their open End near the Bottom of the Receiver. Then, by pumping, the Steams were all drawn downwards, and ſo out at the Top of the Trunks at the Engine; whereas, in the firſt Experiment, they were driven out at the Top of the Receiver.

EXPERIMENT IV. Having ſet a Candle in the cylindric Receiver above-mention'd, without having fill'd it with Steams, and let down the Trunks into the Receiver, below the Flame of the Candle, I laid the wet Leather over the Mouth of the Receiver, leaving about Half an Inch open, for the Air to come in; notwithſtanding which the Candle began to dwindle, and be ready to go out; but working the Engine with the

Trunks

Trunks joyn'd to the forcing Part, the Candle reviv'd, and burn'd, at laſt, as well as in the open Air. When I had left off Pumping, the Flame of the Candle diminiſh'd again; but when it was ready to go out, it reviv'd again, upon forcing in more Air with the Engine.

REMARKS *upon the* EXPERIMENTS.

WHEN Damps in Mines are ſpecifically lighter than common Air, they will be driven out of the Mine by the firſt Experiment.

When Damps are ſpecifically heavier than common Air, they may be ſuck'd out by the Second or Third Experiment.

When a *Sough*, or *Adit*, is carried from a Mine to any diſtant Valley, to diſcharge the Water, or ſave the Trouble of raiſing it quite to the Top of the Pit, *Shafts*, or perpendicular Pits are generally ſunk from the Surface of the Earth to the ſaid Sough, to prevent the Workmen from being ſuffocated as they dig the Sough, and that at a great Expence; but, by the 4th Experiment, freſh Air may be driven down to the Workmen, to continue their breathing free and ſafe, and to keep in their Candles; by which Means the Expence of perpendicular Shafts will be ſav'd.

It has been found by ſeveral Experiments, that a Man may breath a Gallon of Air in One Minute, and a Candle of Six in the Pound will burn nearly as long in the ſame Quantity of Air; therefore the Model only is capable of ſupplying freſh Air to One Man; and conſequently, a large Engine will abundantly ſupply Air for the burning of Candles, and the Working of a great Number of Men in a Mine.

One Man may work an Engine like the Model, and bigger every way in the Proportion of a Foot to an Inch.

As at every Stroke, 14 *cylindrick* (or 11 *cubic*) Feet of Air are driven in, or as many cubic Feet of Damp ſuck'd out, if the Axis of the Cranks be turn'd round 60 Times in a Minute, one Man, in that Time, may change the whole Air in a cubic Space, whoſe Side is 8 Feet; and One Horſe, by working 24 Pumps with Half the Velocity, will eaſily do 4 Times the Work of One Man.

The Engines work with a great deal of Eaſe, becauſe no Preſſure of Atmoſphere is to be remov'd; only a Velocity to be given to one Sort of Air, to change it for another.

Fire will not do in all Caſes, tho' in ſome, it will draw foul Air out of Mines with Succeſs; becauſe ſeveral Sorts of Damps extinguiſh Fire, and ſome fulminate, and are dangerous, when Fire comes near them; and even in common ſtagnant Air, Fire will not keep in long.

I am ſenſible, that large *Bellows* have ſometimes been made Uſe of for this Purpoſe; but they require a much greater Power to produce the ſame Effect, and cannot have the Advantage of being immediately chang'd from *Forcing* to *Sucking*; neither are they ſo cheap as the propos'd Engine, which may be all made of Wood, except the *Crank*, which muſt be of Iron, and the *Barrels* of very thin Copper.